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Nonlinear mixed Cherepanov boundary-value problem

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Abstract

© 2018 Informa UK Limited, trading as Taylor & Francis Group We consider a nonlinear boundary-value problem consisting in the determination of a function (Formula presented.) that is meromorphic in the upper half-plane, satisfies the homogeneous Hilbert boundary condition on the set L of n intervals of the real axis and has a given module on the set (Formula presented.). This problem was stated and solved in Cherepanov. Cherepanov proved that the required solution with a given number and location of its interior zeros and poles and with integrable singularities at all endpoints of L exists if and only if n−1 solvability conditions are satisfied. We prove that this problem is unconditionally solvable. A particular solution, (Formula presented.), is found in the class of meromorphic functions with a properly chosen location of n−1 zeros and poles. Namely, we have shown that these zeros and poles are defined as the solution of some solvable real analogue of the Jacobi inversion problem. A general meromorphic solution of the Cherepanov problem is obtained with the help of the particular solution (Formula presented.). The problem of a possible decrease in the number of zeros and poles of the desired solution is investigated.

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Keywords

analytic functions, closed form solution, Nonlinear mixed boundary-value problem